

INTRODUCTION

At a time when hog prices do not cover the costs of hog production, when food accounts for an even lower fraction of the weekly costs of the U.S. family than it did a generation ago, and when the average American adult consumer has gained an extra seven pounds in body weight in the last decade, it is difficult, some would say self-serving, to persuade the public and, in particular our law-makers, that there is a need for a greater investment in agricultural research. It is a common cliché to state that such research has become the victim of its own success.

There are at least three factors that have contributed to the abundance of American agriculture. One is the natural resource base – the climate, fertile soils and the water resources – of this large and varied country that is needed to grow crops, to feed livestock and to maintain vast forest lands. A second is the importation of a myriad of different kinds of plants and livestock not native to North America that could thrive on our farm lands. The third, and possibly most important factor, has been research carried out to develop, test, and select specific varieties of crop plants and breeds of livestock best suited to U.S. conditions and consumer preferences. Research has also provided profitable management systems (fertilizers, pesticides, equipment, and cultural practices) used to grow healthy productive crops and livestock, and to manage our forests.

Despite the apparent agricultural abundance and the availability of high quality, safe, and affordable food, the future success of American agriculture is not assured. The protection of our food, fiber, and feedstock supply has always been a race against ever-changing pathogen populations, the capriciousness of climate, and the ups and downs of national and world economies. But there are other stresses as well. Subsidies are being reduced and farming communities must adjust to the loss of the economic safety net. The economic downturn in the Far East, along with over-production and the changing eating habits of consumers, has destabilized certain markets. The natural resource base upon which agriculture has depended is not infinitely expandable; its limits may already have been exceeded. The management system designed to maximize profit often does not account for the costs of soil erosion and deterioration, the loss of water quality, and the negative effects of pesticides and other chemicals. Finally, farming activities, whether large or small, are for the most part conducted in areas that are also treasured as “countryside” by urban dwellers and visitors. The value of country vistas and the vitality of the rural communities and the rural way of life are difficult to estimate, but hard economic terms must always figure into any grand plan for agriculture.

Contrary to public expectations, therefore, agricultural research is needed as much now as it was over a century ago when the basis of a national research effort was first organized. A goal is still to produce high-quality food and fiber for the U.S., but we must also now recognize that U.S. agricultural exports are pivotal to the health of the U.S. economy and to feeding an ever-growing world population. Agriculture must produce more on less land. It will be obliged to reduce its dependency on pesticides and antibiotics while simultaneously conserving and restoring the water supply, soils, and fragile ecosystems, as well as maintaining the health and economic well being of rural communities. Accordingly, research within the United States Department of Agriculture (USDA) is organized to provide five broad outcomes:

- An agricultural system that is highly competitive in the global economy
- A safe and secure food and fiber system
- A healthy well-nourished population
- Greater harmony between agriculture and the environment
- Enhanced opportunities for farmers, ranchers, and rural people and communities.

The National Research Initiative (NRI) Competitive Grants Program, which is administered through the Cooperative State Research Education and Extension Service (CSREES), is the major competitive grants program within the USDA research and development portfolio, although representing only about 6% of the Department's Research & Development budget. The NRI is dedicated to the USDA outcomes listed above. To achieve its goals, the NRI attempts to attract research proposals from the highest qualified U.S. scientists, whether or not they are from a traditional college of agriculture. In 1998, for example, 19% of the submitted proposals came from private and public colleges and universities that are not Land-Grant institutions, 4% from private organizations and 4% from Federal agencies, including the Agricultural Research Service (ARS), which is the intramural research arm of the USDA. These proposals are subjected to competitive peer-review by assembled panels of experts, as well as by peers from around the world. Last year the NRI drew upon the services of more than 9000 such experts who judged the proposals on the basis of their scientific merit and originality, as well as to their relevance to long-range improvements and sustainability of U.S. agriculture. Great care is taken to avoid real and perceived conflicts of interest in the peer-review process. Moreover, the NRI always bases its awards on the rankings provided by its panels of reviewers. Post-panel adjustments are not made. The quality of the science is judged paramount.

The *NRI Program Description* is distributed widely within the scientific community and among other interested groups, usually in late summer. The Fiscal Year (FY) 1998 *Program Description*, published in the *Federal Register* on August 6, 1997, identified 26 research programs within the following eight major research areas:

- Natural Resources and the Environment
- Nutrition, Food Safety, and Health
- Animals
- Pest Biology and Management
- Plants
- Markets, Trade, and Rural Development
- Enhancing Value and Use of Agricultural and Forest Products
- Agricultural Systems Research

The Agricultural Systems Research area is funded with two percent of the total dollars available for grants. Due to a shortage of funds, the NRI did not offer the Forest/Range/Crop/Aquatic Ecosystems program (part of Natural Resources and the Environment Research Area) in 1998.

The NRI supports both "fundamental" and "mission-linked" research. Fundamental research tests new ideas and seeks basic scientific information on agriculturally important issues. Mission-linked

research provides scientific understanding needed specifically to solve important current problems important to agriculture, food, forestry and the environment. Approximately 58% of the FY 1998 support was made to fundamental projects; the remaining 42% was judged mission-linked.

The NRI encourages the kinds of multidisciplinary research that are needed to solve complex problems and to initiate research in new areas of science and engineering that are relevant to agriculture, food, forestry and the environment. Multidisciplinary research accounted for 42% of awards in FY 1998.

The majority of awards (83%) in FY 1998 were new standard research projects (excludes Research Career Enhancement Awards, Equipment Grants, Seed Grants, conferences, continuing increments, and supplements). The average grant in this category was \$146,666, with an average duration of 2.3 years--for FY 1997, these figures were \$141,834 for 2.6 years.

The NRI partially supported 37 conferences in FY 1998 with grants totaling \$252,332. These conferences brought scientists together to identify research needs, update one another on research information, and/or advance an area of research important to U.S. agriculture.

In FY 1998, the NRI provided funds totaling \$15,462,324 in Agricultural Research Enhancement Awards (AREA), which included Postdoctoral Fellowships, New Investigator Awards, and Strengthening Awards. This innovative program assists institutions in developing or strengthening the competitiveness of their research programs and in attracting new scientists to careers of national needs in the food, agricultural, and environmental sciences. Strengthening Awards are available to small and mid-sized academic institutions or to institutions in the USDA-EPSCoR states. Four types of Strengthening Awards are available: 1) Research Career Enhancement Awards that support sabbatical leaves; 2) Equipment Grants for the purchase of equipment; 3) Seed Grants to enable investigators to collect preliminary data in preparation for applying for a standard research grant; and 4) Strengthening Standard Research Project Awards that fund research grants at eligible institutions. The NRI reserves about 10% of its available funds for AREA awards.

Finally, the NRI participated in four interagency programs in FY 1998: the Terrestrial Ecology and Global Change Program (National Science Foundation (NSF), Department of Energy (DOE), USDA, National Aeronautics and Space Administration (NASA)), the *Arabidopsis* Genome Sequencing Project (NSF, DOE, USDA), the Interagency Metabolic Engineering Program (DOE, NSF, Department of Commerce (DOC), Department of Defense (DOD)), and the Collaborative Research in Plant Biology (NSF, DOE, USDA). The funding equivalent of one or two grants is provided to each of these programs.

This report provides brief descriptions, provided by the investigators, of the 676 new research grants funded by the NRI in Fiscal Year 1998. This fundamental and mission-linked research seeks to address problems critical to the future of agriculture. Many of these projects will be carried out by one or two investigators representing a single discipline, but others are from teams of investigators representing several disciplines.

I am proud of the quality of these proposals and of the peer review process that ranked them. I am especially grateful to the dedicated staff-scientific, administrative and clerical-who make the NRI work so well in the service of U.S. agriculture.

R. Michael Roberts
Chief Scientist
National Research Initiative Competitive Grants Program
Cooperative State Research, Education, and Extension Service
United States Department of Agriculture